

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of December 14, 2010 is respectfully requested.

By this Amendment, claim 6 has been amended. Thus, claims 6-8 are currently pending in the application. No new matter has been added by these amendments.

On pages 2-5 of the Office Action, the Examiner rejected claims 6-8 under 35 U.S.C. § 103(a) as being unpatentable over Shintani (JP 11-080952) in view of Sakemi et al. (US 6,245,394), Okuyama et al. (JP 2001-243886), Hidaka et al. (JP 10-106441) and Kim et al. For the reasons discussed below, it is respectfully submitted that the amended claims are clearly patentable over the prior art of record.

Amended independent claim 6 recites a method for manufacturing a plasma display panel (PDP) including a process for forming a metal oxide film onto a substrate of the PDP. The method of claim 6 includes introducing inert gas, oxygen and at least one gas selected from the group consisting of carbon monoxide and carbon dioxide into the deposition room during deposition of the metal oxide film. The method of claim 6 also includes controlling an amount of dangling bonds in the metal oxide film, and equilibrating the amounts of the gasses introduced into the deposition room with an amount of gas exhausted from the deposition room by a vacuum exhausting system so as to maintain a degree of vacuum in the deposition room within a range of 1×10^{-1} Pa to 1×10^{-2} Pa. Further, claim 6 recites that *the oxygen gas is introduced into the deposition room so as to restrain the amount of dangling bonds in the metal oxide film*, and that *the at least one gas is introduced into the deposition room so as to increase the amount of dangling bonds in the metal oxide film*.

Shintani discloses a vapor deposition method in which oxygen is introduced into the processing chamber. Further, Shintani discloses that an oxygen introduction amount and an exhaust speed of the processing chamber are controlled such that the partial pressure of the oxygen becomes equal to a set value. However, as noted by the Examiner on page 3 of the Office Action, Shintani does not disclose (a) a deposition room having a degree of vacuum *within a range of 1×10^{-1} Pa to 1×10^{-2} Pa*, (b) *introducing inert gas into the deposition room during deposition of the metal oxide film*, (c) *introducing at least one gas selected from the group consisting of carbon monoxide and carbon dioxide into the deposition room during*

deposition of the metal oxide film, and (d) controlling an amount of dangling bonds in the metal oxide film, as required by independent claim 6.

In this regard, the Examiner cites Sakemi as disclosing a film growth method in which a degree of vacuum in the vacuum chamber is 10^{-4} Torr (1.3×10^{-2} Pa), which is within the range recited in claim 6. Further, the Examiner cites Okuyama as disclosing a method for manufacturing a plasma display panel in which a mixture of oxygen and an inert gas is introduced into a vacuum chamber. In addition, the Examiner cites Hidaka as disclosing introducing steam and oxygen into the chamber during deposition of an MgO film in order to enhance the crystal orientation of the film. The Examiner also cites Kim as disclosing that the secondary emission coefficient changes for an MgO film with exposure to water vapor or carbon dioxide.

Therefore, the Examiner concludes that it would have been obvious to one of ordinary skill in the art to operate the process of Shintani under a degree of vacuum taught by Sakemi, and to incorporate the introduction of an inert gas as taught by Okuyama into the process of Shintani. In addition, the Examiner also indicates that it would have further been obvious to modify the process of Shintani to include the introduction of steam as taught by Hidaka in order to enhance the crystal orientation of the MgO film, and to use carbon dioxide as taught by Kim as an alternative to the water vapor of Hidaka so as to arrive at the invention of claim 6.

However, none of the Sakemi, Okuyama, Hidaka and Kim references discloses *introducing at least one gas selected from the group consisting of carbon monoxide and carbon dioxide into the deposition room during deposition of the metal oxide film so as to increase the amount of dangling bonds in the metal oxide film, as required by independent claim 6.*

In particular, it is first noted that Sakemi and Okuyama do not disclose introducing at least one gas selected from the group consisting of carbon monoxide and carbon dioxide into the deposition room during deposition of a metal oxide film. Further, Hidaka also does not disclose introducing carbon monoxide or carbon dioxide into the deposition room during deposition of a metal oxide film, and instead only discloses that a deposition chamber contains steam and oxygen.

As indicated above, the Examiner cites Kim as disclosing that the secondary emission coefficient changes for an MgO film with exposure to water vapor and carbon dioxide, and therefore asserts that it would have been obvious to use carbon dioxide as taught by Kim as an

alternative to the water vapor of Hidaka. Further, on pages 5-6 of the Office Action, the Examiner notes that page 8, lines 4-8 of the specification of the present application discloses that a state of the secondary electron emission changes due to the generation of dangling bonds, and therefore asserts that controlling the amount of carbon dioxide introduced would control the secondary electron emission coefficient and thereby inherently control the amount of dangling bonds in the metal oxide film.

However, it is noted that Kim does not disclose introducing at least one gas selected from the group consisting of carbon monoxide and carbon dioxide *into the deposition room during deposition of the metal oxide film so as to increase the amount of dangling bonds in the metal oxide film*, as required by independent claim 6. Rather, Kim discusses how discharge characteristics of a PDP are affected by post-treatment of an MgO film (*i.e.*, the subsequent treatments of a panel after MgO film deposition) (*see* Title and page 1, column 1). In particular, Kim discusses the properties of the MgO film with regard to heat treatment and discharge aging, which occur after the film has been deposited, as shown in Fig. 3.

Further, Kim discloses that the secondary electron emission coefficient γ_i increases with the heating of an MgO film, as shown in Fig. 9. However, the heating of an MgO film (which has already been deposited) clearly does not correspond to introducing at least one gas selected from the group consisting of carbon monoxide and carbon dioxide into the deposition room during deposition of the metal oxide film, as required by claim 6.

Further, Kim discloses that the variation of γ_i values caused by heating (shown in Fig. 9) is similar to the results reported by Whetten and Lapovsky, in which “ γ_e , the electron impact secondary electron emission, decreased with the exposure of MgO thin films to water vapor and carbon dioxide” (page 5, column 1). However, this portion of Kim does not disclose introducing carbon dioxide into the deposition room during deposition of the metal oxide film, and only refers to the exposure of MgO thin films (*i.e.*, films which have already been deposited) to water vapor and carbon dioxide.

Therefore, as Kim only discloses exposing films which have already been deposited to heat (or water vapor and carbon dioxide), Kim does not disclose introducing at least one gas selected from the group consisting of carbon monoxide and carbon dioxide into the deposition room during deposition of the metal oxide film so as to increase the amount of dangling bonds in the metal oxide film, as required by independent claim 6.

In addition, while page 8, lines 9-17 of the original specification of the present application discloses that introducing a gas such as carbon dioxide into the deposition room during the deposition process can increase the amount of dangling bonds in the film, this disclosure does not establish that subjecting a deposited film to carbon dioxide (as disclosed in Kim) would necessarily result in an increase or decrease in the amount of dangling bonds in the film. Therefore, page 8, lines 9-17 of the original specification of the present application does not support the Examiner's assertion that controlling the amount of carbon dioxide in Kim (*i.e.*, after a film has been deposited) would inherently control the amount of dangling bonds in the film.

Therefore, it is respectfully submitted that none of the Shintani, Sakemi, Okuyama, Hidaka and Kim references discloses or suggests, either alone or in combination, a method which includes introducing at least one gas selected from the group consisting of carbon monoxide and carbon dioxide into the deposition room during deposition of the metal oxide film so as to increase the amount of dangling bonds in the metal oxide film, as required by independent claim 6.

Therefore, for the reasons presented above, it is believed apparent that the present invention as recited in independent claim 6 is not disclosed or suggested by the Shintani reference, the Sakemi reference, the Okuyama reference, the Hidaka reference and the Kim reference, taken either individually or in combination. Accordingly, a person having ordinary skill in the art would clearly not have modified the Shintani reference in view of the Sakemi reference, the Okuyama reference, the Hidaka reference and the Kim reference in such a manner as to result in or otherwise render obvious the present invention of independent claim 6.

Therefore, it is respectfully submitted that independent claim 6, as well as claims 7 and 8 which depend therefrom, are clearly allowable over the prior art of record.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice to that effect is respectfully solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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May 6, 2011